Demonstration Of Advanced Battery-Electric School Bus At Napa Valley Unified School District

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UCDAVIS HYBRID ELECTRIC VEHICLE CENTER

Presentation Outline

- UC Davis Hybrid Electric Vehicle Center
- UC Davis Responsibilities
- Project Experience
- Project Results

The UCD Hybrid Electric Vehicle Center

- Four-time overall winner of international HEV design competitions in the past 10 years.
- Design experience on both ground-up and retrofitted hybrid electric vehicles.
- Hybrid vehicles are plug-in, charge-depleting designs.
- Extensive experience with high-voltage systems in vehicles.

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UC Davis Responsibilities

UCD worked on 3 electric buses in Napa. The Zebra bus, a NiMH bus, and a Pb-Acid bus.

- Modeling
- Data Collection
- Analysis
- Bus Maintenance
- Final Report

Project Experience

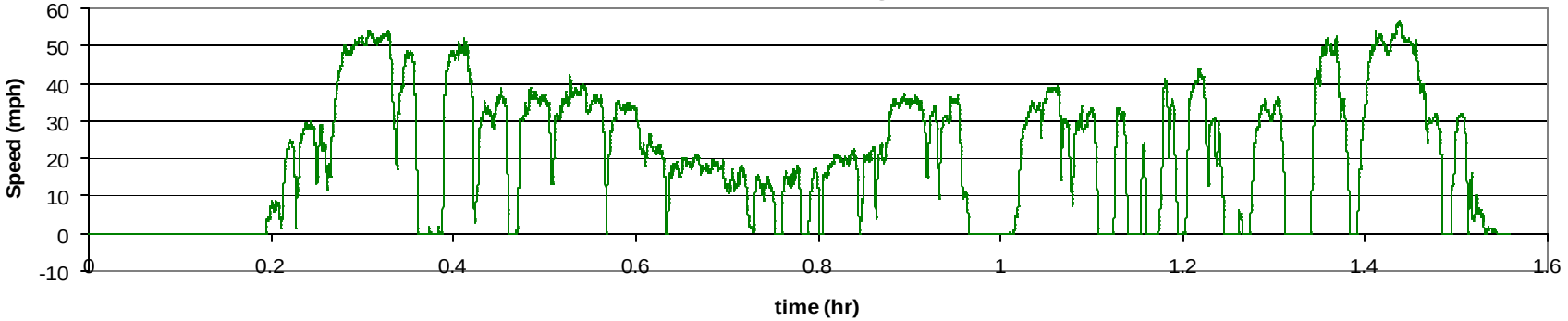
- Some basic bus maintenance performed.
- Acted as technical liaison between NVUSD and manufacturers to identify and solve issues.
- Installation of DART data acquisition systems.
- Data Collection on laptops while the buses are in service.
- Data Analysis.

Project Experience

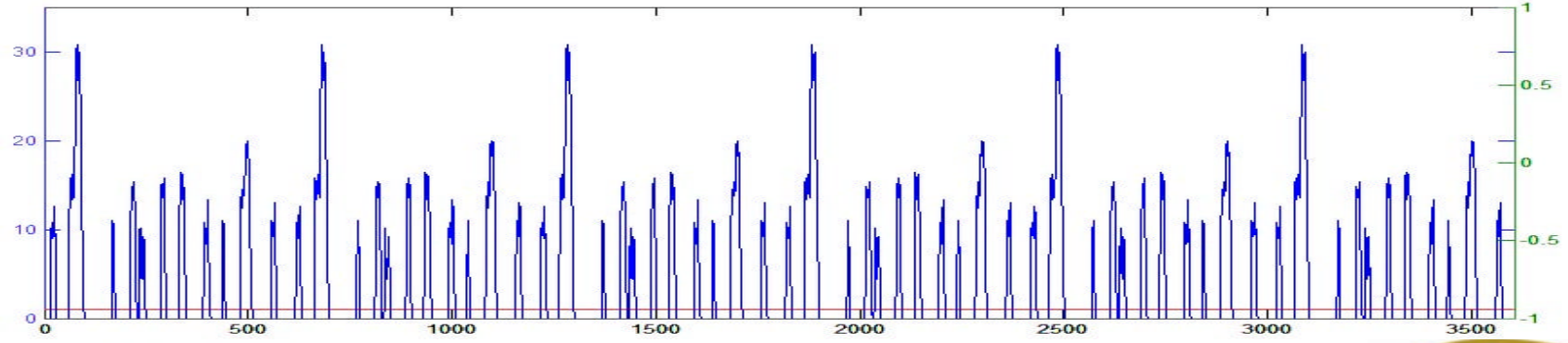
- Drivers liked the electric buses once they became confident driving them.
- Buses provided sufficient drive power, drivers especially pleased with acceleration.
- Noise Reduction compared to standard Diesel or CNG buses.

Drive Profile

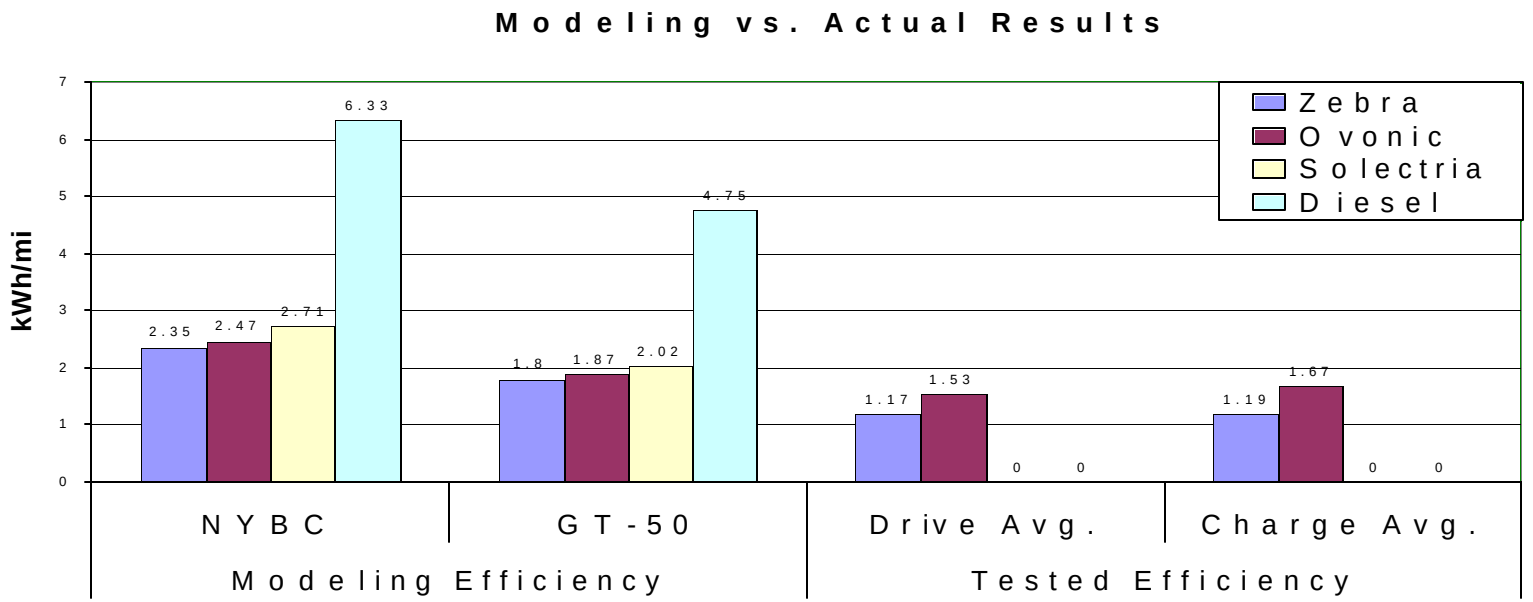
Zebra Bus Morning 9-10-03



NY Bus Cycle (6x)



Project Results



- Charge efficiency should be lower than drive efficiency due to inherent losses in charging.

Project Results

- Zebra bus reliable on a day-to-day basis.
- Small issues that affected daily use were fixed easily.
- Competed in a rigorous road-course, fully loaded to GVW in the Challenge Bibendum, an international advanced vehicle competition.

Summary

- Electric buses are unique and require some special maintenance.
- Most significant reason that the Zebra bus was successful is that Santa Barbara Electric Bus Works was willing to participate in the troubleshooting and maintenance of the bus.

Summary

- Meets or exceeds all performance requirements demanded by the drivers.
- Expected range of 50-60 miles per charge is sufficient for most routes.
- Produces no emissions at student pick-up and drop-off points.
- School bus fleets are an ideal application for electric only propulsion systems, due to their generally short trips and long time between trips which allows for several hours of charging.